

SMS Spring 2024 Seminar Series

Friday March 22 | 3:00 pm | Biodesign Auditorium

Defects Chemistry as a Design Parameter to Enable Functional Electronics

The advancement of electronics, along with its cornerstones - the Internet of Things, artificial intelligence, and energy-related devices - is closely linked to our ability to control “good” and “bad” defects at different length scales. Nonetheless, this progress faces constraints due to significant variability and a prevailing phenomenological approach to materials design. In this talk, we will discuss how defects chemistry can be used to: (1) control the assembly of layered inorganic and organic systems and interfaces at the molecular level (orientation and mode of attachment), (2) match phonon band structure in coordination polymers with discrete vibrations within the molecule, and (3) tune energetic offsets for effective charge and spin transfer in self-doped organic materials. This defect control as a design parameter may ultimately govern charge transport, the preservation of coherence, and energy transfer in functional electronic and energy devices. We will also discuss how we can use diffraction and spectroscopy to correlate changes in the electronic structure as a function of the morphology and defect states in layered metal chalcogenides and π -d conjugated organic systems. We will then compare and contrast different doping methods to increase the carrier and spin concentrations in materials.

Luisa Whittaker-Brooks, PhD

Associate Professor, University of Utah

Luisa Whittaker-Brooks is an Associate Professor of Chemistry at the University of Utah. Her research centers on the design of well-defined hybrid materials with controlled morphology and interfaces that serve as conduits for deterministic and coherent energy and charge transfer for applications in *energy conversion, storage, and electronics*. Dr. Whittaker-Brooks received her B.S. degree in Analytical Chemistry from the University of Panama. Under a Fulbright Fellowship, she received her M.S. and Ph.D. degrees in Materials Chemistry from the State University of New York at Buffalo. She was a postdoctoral researcher in the Department of Chemical and Biological Engineering at Princeton University. She is the recipient of the 2013 L’Oréal Fellowship for Women in Science Award and the 2015 Marion Milligan Mason Award for Women in the Chemical Sciences administered by the American Association for the Advancement of Science (AAAS). She was named a Scialog and Cottrell Fellow by the Research Corporation for Science Advancement (RCSA), a Talented 12 by C&En news, and a GERA Ovshinsky Energy Fellow by the American Physical Society (APS). She is also the recipient of a Department of Energy Early Career Award, a Sloan Fellowship in Chemistry, and the Camille Dreyfus Teacher Scholar Award. In April 2023, she received the Outstanding Early Career Investigator Award by the Materials Research Society (MRS).

